



TITLE:

Quantum Monte Carlo simulation with
Tensor Network States(New Development of
Numerical Simulations in Low-Dimensional
Quantum Systems: From Density Matrix
Renormalization Group to Tensor Network
Formulations)

AUTHOR(S):

Wang, Ling; Verstraete, Frank

CITATION:

Wang, Ling ...[et al]. Quantum Monte Carlo simulation with Tensor Network States(New Development of Numerical Simulations in Low-Dimensional Quantum Systems: From Density Matrix Renormalization Group to Tensor Network Formulations). 物性研究 2011, 9 ...

ISSUE DATE:

2011-03-05

URL:

<http://hdl.handle.net/2433/169454>

RIGHT:

Quantum Monte Carlo simulation with Tensor Network States

Ling Wang¹ and Frank Verstraete¹

¹ Faculty of physics, Boltzmanngasse 5, 1090 Vienna, Austria

We demonstrate that by applying Quantum Monte Carlo sampling over physical indices of a tensor network state, one could effectively reduce the computational cost of contracting a lattice. A tensor network with much larger bond dimension can be handled via importance sampling. Combining the Quantum Monte Carlo sampling with a computational fast contraction method, namely Tensor Entanglement Renormalization method to approximately contract the tensor network state, we present a bench-mark study of dimerized Heisenberg model on square lattice with bond dimension upto 8.

References

L. Wang, F. Verstraete, to be published.